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Review Article:

Analysis of the possible sexual transmission of SARS-CoV-2

Análisis de la posible transmisión sexual del SARS-CoV-2

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Abstract

Introduction: the SARS-CoV-2 virus is the etiological agent of the COVID-19 pandemic, which interacts with cells via the SPIKE protein on the surface of the viral envelope with the ECA-2 receptors, hence the presumption of sexual transmission. **Materials and methods:** an exploratory, descriptive, documentary research was performed by means of a systematic search of studies and publications in the Pubmed, SCIELO and HINARI databases; additionally, the search was expanded to the researchgate repository, with the aim of identifying the possible sexual transmission of SARS-CoV-2. **Results:** according to the inclusion and exclusion criteria of the study, 10 publications exploring sexual transmission of SARS-CoV-2 were included. Conclusions: despite positive results for virus detection in vaginal or seminal fluid obtained in the studies,

Keywords: Coronavirus Infections, Sexually Transmitted Diseases, Viral, Research.

Resumen

Introducción: El virus SARS-CoV-2 es el agente causal de la pandemia de COVID-19, el cual interactúa con las células a través de la proteína SPIKE en la superficie de la envoltura viral con los receptores ECA-2, de ahí la existencia de la presunción de transmisión sexual . **Materiales y métodos:** se realizó un estudio exploratorio, descriptivo, documental mediante una búsqueda sistemática de estudios y publicaciones en las bases de datos Pubmed, SCIELO e HINARI; Adicionalmente, se amplió la búsqueda al repositorio de la puerta de Investigación, con el objetivo de identificar la posible transmisión sexual del SARS-CoV-2. Resultados: según los criterios de inclusión y exclusión del estudio, se incluyeron 10 publicaciones que exploraron la transmisión sexual del SARS-CoV-2. Conclusiones:

Palabras clave: Infecciones por Coronavirus; Enfermedades Virales de Transmisión Sexual; Investigación.

Introduction

At the beginning of December 2019 in the city of Wuhan (Hubei province, People's Republic of China) cases of pneumonia of unknown origin were reported notified to the Center for Disease Control of China, being reported on January 3, 2020 to the World Organization Health (WHO) and, later on January 30, it was considered by the WHO as a health emergency of international interest, being considered a pandemic on March 11, 2020, identifying the SARS-CoV-2 virus as the causal agent and naming the disease entity as coronavirus disease 2019 (COVID-19 by its English name)[1-3].

The identification of the viral agent in question was carried out by means of RNA sequencing using bronchoalveolar lavage samples, after determining that it was a new species of the Coronavirus family. The agent was initially named "WH-Human 1 coronavirus", later as 2019 novel coronavirus (2019-nCoV). The new species was similar to SARS-CoV-2, the etiological agent of the severe acute respiratory syndrome that occurred in the province of Guangdong (China) in November 2002, which is why the viral agent was finally named as SARS-CoV-2 and the disease caused by this as COVID-19 [4].

SARS-CoV-2 is a positive enveloped single-stranded genomic RNA virus, belonging to the group of beta coronaviruses, whose dissemination occurs mainly through close human interaction or spilled respiratory substances (flugge droplets) from infected people [4-8]. Its entry into the cell is mediated through the direct interaction of the SPIKE protein of the virus with the receptor for angiotensin-converting enzyme-2 (ACE-2); Its clinical picture varies from asymptomatic or with nonspecific symptoms, to serious presentations caused by the severe inflammatory reaction triggered by the infection, with approximately 80% mild symptoms characterized by headache, fever and dyspnea to more severe complications.

According to the WHO, the frequency of presentation of clinical manifestations includes expectoration (33%), myalgias and arthralgias (15%), odynophagia and headache (14%), nausea, vomiting and nasal congestion (5%) [10-13] ; Additionally, there is growing evidence that the symptoms of anosmia and dysgeusia are related to COVID-19, therefore, they can be used as an effective detection tool and help in its diagnosis [14].

The transmission of the SARS-CoV-2 virus between humans is by the respiratory route, and in most cases, it manifests itself with a clinical picture of infection in the upper respiratory tract.[10]; The importance of the ACE-2 receptors in infection by the SARS-CoV-2 virus and how it uses them to enter the host cell is well known, the expression of ACE-2 in multiple locations of the body (type II alveolar cells in the lungs, glandular cells of the rectal epithelium, as well as in the gastrointestinal system, reproductive system, etc.) 15 leads to consider the possibility that there are new routes of contagion, including the sexual transmission route [15-17].

The regulations adopted at present linked to the prevention of an increase in the number of SARS-CoV-2 infections in the world (social isolation, quarantine, restrictions on mobilization, etc.) represent a behavioral change for the lifestyle of the human being; Although it is true, this change is necessary, this could be the trigger for a new problem as a result of the population's rejection of the adaptation of the established measures; Among the many counterproductive behaviors to be expected, there is the probability of an increase in risky sexual behaviors (not using condoms during intercourse, polygamy, chance encounters, etc.), which could lead to an increase in infections due to diseases that include in its routes of transmission to the sexual route; Thus.

Materials and methods

An exploratory, descriptive, documentary study was carried out in order to analyze the available evidence about the possible sexual transmission of SARS-CoV-2; The purpose of the study was to examine, organize and synthesize the available information regarding the sexual transmission of SARS-CoV-2.

To obtain the information, a methodological search was applied in the Pubmed, SCIELO and HINARI databases, with the use of MESH terms and Boolean operators as follows "Sexually Transmitted Diseases, Viral" AND "SARS-CoV-2" NOT " SARS Virus "NOT" Middle East Respiratory Syndrome Coronavirus ", applying the filters: open access publications (Open Access, Free Full Text), publication year between 2019 and 2021 (the results available until March 15 were included, the date on which searched for information), languages (English and Spanish), type of studies (observational studies and case reports) and species (human).

The discussion was elaborated from the search results, by means of the analysis-synthesis method; The following inclusion and exclusion criteria were applied to the results obtained in the information search; Publications such as case reports and observational studies that explore the infectious viability of SARS-CoV-2 in reproductive system fluids were included; studies and case reports published in Spanish and English languages carried out in humans from December 2019 published until February 2021; the studies and case reports to be selected will be those that have a vision of importance for the field of medicine or microbiology; open access publications. Publications that explore other routes of transmission other than sexual transmission were excluded. publications that exclude patients infected or recovered from SARS-CoV-2 infection; publications exploring SARS and MERS viruses. Due to the limited evidence that met the inclusion and exclusion criteria, it was decided to broaden the search in the Research gate network, obtaining 18 related articles.

Results

In the search for the information carried out, no results were obtained in SCIELO. The search in PUBMED yielded 1 result, the study described the clinical characteristics of the seminal fluid and results among men with COVID-19. While in HINARI a total of 13 results were obtained.

Based on the inclusion and exclusion criteria, articles were selected that explored the sexual transmission of SARS-CoV-2, excluding articles from PUBMED, HINARI and SCIELO as they did not yield studies that met these criteria. From Research gate, 18 related results were obtained, but only 10 publications available in open access that met the inclusion criteria were included. The types of articles that make up the discussion are detailed

Table 1. Results of the methodological research

#	Year of publication	Item Type	N	n
1	2020	Original cohort study article	38	6
2	2020	Correspondence	-	-
3	2020	Investigation article	20	19
4	2020	Letter to the editor	-	-
5	2020	Preprint - research article	31	0
6	2021	Letter to the editor	-	-
7	2020	Letter to the editor	-	-
8	2021	Prospective cross-sectional study	43	11
9	2020	Opinion article	-	-
10	2020	Review article	-	-

Universe (N), Sample (n)

Discussion

The symptoms of COVID-19, a disease caused by the viral agent SARS-CoV-2, has been described in detail and adequately in multiple research papers. Indeed, respiratory and gastrointestinal manifestations were the first to be considered and, consequently, the most widely known about. However, given the possibility that SARS-CoV-2 could compromise cells in different locations in the body, specifically in the reproductive system, it is urgent to carry out research with a broader focus; In response, many authors expose the presence of SARS-CoV-2 in seminal fluid samples from patients with COVID-19 or in their respective recovery phase. However, the need for a greater approach to the issue is also discussed 18.

In a study carried out in China in 2020 with seminal fluid samples from 38 participants, it was described that 23 presented clinical recovery from COVID-19 and 15 were in the acute phase of the infection. In addition, the presence of SARS-CoV-2 was determined by means of the reverse transcriptase polymerase chain reaction assay in 6 patients from the study population; of the samples analyzed, 4 came from patients who were in the acute phase of the disease and 2 came from those who had recovered 19. On the other hand, Jokotola et al. 2020, in Lagos (Nigeria), they recruited 20 male patients and subjected them to 2 seminal fluid tests (on admission and 5 days later), to detect the presence of structures other than sperm cells (cataloged as coronavirus), reporting that in both samples 100% of the cases expressed positivity to the presence of said structures. However, this study was limited by the non-identification of SARS-CoV-2 in seminal fluid using the reverse transcriptase polymerase chain reaction assay.

In a study in Kırşehir (Turkey), released as a preprint, with a population of 31 women, selecting a sample of 22 patients in which 9 members of the population were excluded due to menstruation; 2 samples of cervicovaginal fluid were taken with an interval of 14 days between the first and the second sample, emphasizing that all the patients had previous detection of SARS-CoV-2 by nasopharyngeal swabs; The cervicovaginal fluid samples were transported in tubes of Bio-Speedy viral nucleic acid (vNAT), and later the viral RNA was extracted using the Bio-Speedy SARS-CoV-2 RT-qPCR kit and the Bio-Rad CFX96 device. TouchTM, with negative results in the samples (100%)[21]. Scorzolini et al. real-time reverse transcriptase polymerase chain reaction, a patient who was part of his initial series of cases (2 men and 1 woman). However, this was the only vaginal swab sample performed in the patient who was positive for the viral agent in question.

Gacci et al. 2021 selected 43 patients, in which a total of 170 samples were collected, which were taken in urine before and after ejaculation, saliva and seminal fluid; They were analyzed by RT-PCR. It should be noted that only 7% of the population (3 patients) were positive for SARS-CoV-2, in one of the samples collected, sharing the pattern of being identified after the second negative sample from each patient and in different localization (urine before and after ejaculation, saliva and seminal fluid). However, after repeating theSARS-CoV-2 RNA in this group of patients and their respective partners, these were negative 23.

Taha et al. 2020 evaluated the possibility of COVID-19 transmission by sexual means by reviewing multiple articles; included research papers that affirmed the hypothesis in question, based on the selective expressivity of the ACE-2 receptors at the level of testicular Leydig cells in adult patients [24]. Additionally, Patel et al. 2020 mention, in their opinion article, the expressiveness of these receptors at the level of structures related to the male reproductive system (cells of the seminiferous ducts, spermatogonia, Sertoli cells), quite apart from the already mentioned Leydig cells [25] However, in the research by Taha et al. 2020 also include studies that refute this hypothesis, in which the work of Song et al, Stands out.

Conclusion

COVID-19 disease transmitted by the SARS-CoV-2 virus is considered to date a health problem of international concern; As already described, the viral agent has the predisposition to compromise multiple areas of the human body due to its affinity for ACE-2 receptors, which suggests the probability that there are new transmission routes, opening the possibility of the transmission route sexual. However, the documented evidence in this regard is not sufficient to affirm or deny this hypothesis; Although some studies suggest the absence of risk of sexual transmission of SARS-CoV-2, they also recognize limitations in their studies. Therefore, more studies are required to cover the issue.

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